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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/601,310	07/31/2000	Sang-young Lee	202021/140	9736

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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/601,310	LEE ET AL.
	Examiner	Art Unit
	Susan W Berman	1711

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is suggested that proper Markush language "selected from the group consisting of ...and..." be used in claims 3, 6, 7, 12, 20, 26, 27, and 28.

In claim 3, it is not clear how electrons, air or any of the reactive or inert gases recited provide "ionic particles". The claim appears to recite "ion generating gases" that produce energized ions. See page 8, lines 13-16.

In claim 7, it is not clear what is meant by "wherein the material of polymer membrane is one or more polyolefin blend or polyolefin laminates". How many blends or laminates can be used? Does applicant intend to recite "wherein the material of polymer membrane is a polyolefin blend or polyolefin laminate wherein the polyolefins are selected from..." ?

Claim 9: it is suggested that "using" be replaced with "comprising a".

Claims 15-28 and 30, it is suggested that "method for reforming the surface" be replaced with "method for providing hydrophilicity or increased hydrophobicity to the surface of a polymer membrane" because "reforming the surface" is disclosed as meaning forming radicals on the surface of the polymer, which requires only step a).

Claim 15: it is suggested that applicant rewrite the claim to recite steps (a) and (b) as follows:

a) inserting a polymer(ic) membrane into a vacuum chamber and irradiating the surface of the polymer membrane with energized ionic particles under high vacuum and

b) treating the surface-activated polymer membrane obtained in step a) by infusing a reactive gas onto the surface of the polymer membrane to cause reaction of the gas with the polymer surface.

Claim 30: it is suggested that applicant rewrite the claim to recite steps (a) and (b) as follows:

a) inserting a polymer into a vacuum chamber and irradiating the surface of the polymer with energized ionic particles under high vacuum and

b) treating the surface-activated polymer obtained in step a) by infusing a reactive gas onto the surface of the polymer membrane to cause reaction of the gas with the polymer surface.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 9-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Stinnett et al (5,900,443, filed 11-22-1996). Stinnett et al disclose a process for treating a polymer surface by irradiation with high energy particle beams. Stinnett et al teach irradiating polymers such as polypropylene, polyimide or polycarbonate including two different types of polymers in layers. See column 4, column 6, line 58, to column 7, line 62. There is no mention of blowing a reactive gas over the surface of a polymer.

Claims 9-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Stinnett et al (5,473,165). Stinnett et al disclose methods and apparatus for altering the surfaces of materials using a repetitively pulsed ion beam system. Stinnett et al teach using the method to produce non-equilibrium microstructures, etching or crosslinking of polymers, to produce thin layers of amorphous material or to form very fine grain materials for advanced battery applications (column 3, lines 41-54, and column 8, lines 25-31). There is no mention of blowing a reactive gas over the surface of a polymer.

Claims 1-7 and 9-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Machi et al (4,376,794). Machi et al disclose a process for production of a separator comprising irradiating a polyolefin film with ionizing radiation at a dose rate of 5×10^4 to 10^7 rads/sec. and contacting the irradiated film with an aqueous monomer solution to obtain a grafted film. Irradiation can be carried out in vacuum or in inert gas.

Claims 1-3 and 9-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Urairi et al (5,282,965). Urairi et al disclose treating the surface of a PTFE porous membrane with a low temperature plasma to render the surface hydrophilic. The treatment can take place at low gas pressure from 0.01 to 10 torr. See column 2, lines 33-45. The pressure in Example 1 is 0.02 torr.

Claims 1-6 and 9-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Karakelle et al (4,885,077). Karakelle et al disclose a porous composite membrane. The membrane is produced by inserting a monomer-coated base membrane into a plasma generator, evacuating the chamber and treating the membrane with the plasma. See column 5, lines 22-52, column 6, lines 7-11, and the Examples.

Claims 1-6 and 9-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Ohnishi (5,028,332). Ohnishi discloses forming a hydrophilic material by subjecting the surfaces of a polymer to a plasma treatment. The Examples teach plasma treatment at an argon pressure of 0.1 torr and graft polymerization of a hydrophilic monomer in gas phase.

Claims 9-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Korean Laid-Open Patent Publication No. 96-37742, as discussed on page 4 of the specification. Publication No. 96-37742 discloses a process for modifying the surfaces of a polymer by irradiating energized ion particles onto the surfaces of the polymer under vacuum while blowing a reactive gas directly over the surface of the polymer to decrease the wetting angle of the surface. See page 4, lines 5-14.

Claims 9-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Jung et al (5,965,629). Jung et al disclose a process for modifying the surfaces of a polymer by irradiating energized ion particles onto the surfaces of the polymer under vacuum while blowing a reactive gas directly over the surface of the polymer to decrease the wetting angle of the surface. See column 4, line 39, to column 7, line 49, and Examples 1-3.

Claims 9-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Koh et al (5,783,641). Koh et al disclose a process for modifying the surfaces of a polymer by irradiating energized ion particles onto the surfaces of the polymer under vacuum while blowing a reactive gas directly over the surface of the polymer to decrease the wetting angle of the surface. See column 4, line 19, to column 7, line 50, and Examples.

Claims 1-3, 6, 8-20, 23, 24, 27, 29 and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Masuoka et al (4,845,132). Masuoka et al disclose production of a hydrophilic porous membrane by irradiating a hydrophobic porous membrane with plasma in the presence of a hydrophilic monomer in gaseous state. Plasma irradiation takes place under a vacuum, for example at 0.1 Torr of argon gas (Examples). The graft polymerization is carried out under pressure in the range from 10^{-2} to 10^{4} Torrs. See column 6, lines 37-42, column 6, line 58, to column 8, line 23.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-7 and 9-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Korean Laid-Open Patent Publication No. 96-37742, as discussed on page 4 of the specification, Jung et al (5,965,629) or Koh et al (5,783,641), each in view of Masuoka et al. Each of Korean 96-37742, Jung et al and Koh et al disclose a process for modifying the surfaces of a polymer by irradiating energized ion particles onto the surfaces of the polymer under vacuum while blowing a reactive gas directly over the surface of the polymer to decrease the wetting angle of the surface. See column 4, line 39, to column 7, line 49, and Examples 1-3. Patentees do not mention treating polymer membranes, polyolefin blends or laminates.

Masuoka et al teach that a hydrophilic porous membrane can be treated with ionized particles in analogous art. It would have been obvious to one skilled in the art to employ the polymeric porous membranes disclosed by Masuoka et al in an analogous process as the polymer to be treated in the process disclosed by each of the primary references. One of ordinary skill in the art at the time of the invention would have been motivated by a reasonable expectation of success.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Korean Laid-Open Patent Publication No. 96-37742, as discussed on page 4 of the specification, Jung et al (5,965,629) or Koh et al (5,783,641), each in view of Masuoka et al, as appplied to claim 1 above, and further in view of Lazear (4,346,142). None of the primary references nor Masuoka et al mention the method of manufacturing the porous membrane to be treated.

Lazear discloses a microporous polyolefinic film prepared by cold and/or hot stretching or by wet stretching that is then rendered hydrophilic by exposing the surface to about 1 to about 10 megarads of ionizing radiation. It would have been obvious to one skilled in the art to employ a microporous film prepared by hot and/or hot stretching or by wet stretching, as taught by Lazear for use in an analogous method, in the method for producing a hydrophilic porous membrane disclosed by Masuoka et al. One of ordinary skill in the art at the time of the invention would have been motivated by a reasonable expectation of success because Masuoka et la teach starting with a porous membrane having pore diameters in the range from 0.05 micrometers to 1 micrometers and Lazear teaches an average pore size from about 200 to about 10000 Angstroms thus providing the desired pore size fro the process of Masuoka et al as well.

Claims 1-7, 9-25 and 27-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masuoka et al (4,845,132). Masuoka et al disclose production of a hydrophilic porous membrane by irradiating a hydrophobic porous membrane with plasma in the presence of a hydrophilic monomer in gaseous state. Plasma irradiation takes place under a vacuum, for example at 0.1 Torr of argon gas (Examples). The graft polymerization is carried out under pressure in the range from 10^{-2} to 10^{4} Torrs. See column 6, lines 37-42, column 6, line 58, to column 8, line 23.

With respect to claims 4, 5, 21 and 22, It would have been obvious to one skilled in the art to determine the energy and dose of ion particles required to obtain the desired product from the teachings of Masuoka et al. With respect to claims 7 and 28, It would have been obvious to one skilled in the art to treat a blend of polyolefins since Masuoka et al teach that different kinds of polyolefins can be treated by the disclosed method. With respect to claim 25, It would have been obvious to one skilled in the art to determine the rate of infusion of gas required to obtain the desired energy and dose of ion particles and the desired product in the method disclosed by Masuoka et al.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Masuoka et al (4,845,132) in view of Lazear (4,346,142). Masuoka et al disclose production of a hydrophilic porous membrane by irradiating a hydrophobic porous membrane with plasma in the presence of a hydrophilic monomer in gaseous state. Plasma irradiation takes place under a vacuum, for example at 0.1 Torr of argon gas (Examples). See column 6, lines 37-42, column 6, line 58, to column 8, line 23. Masuoka et al do not mention the method of manufacturing the porous membrane to be treated but does mention the properties desired (column 8, lines 24-55).

Lazear discloses a microporous polyolefinic film prepared by cold and/or hot stretching or by wet stretching that is then rendered hydrophilic by exposing the surface to about 1 to about 10 megarads of ionizing radiation. It would have been obvious to one skilled in the art to employ a microporous film prepared by hot and/or hot stretching or by wet stretching, as taught by Lazear for use in an analogous method, in the method for producing a hydrophilic porous membrane disclosed by Masuoka et al. One of ordinary skill in the art at the time of the invention would have been motivated by a reasonable expectation of success because Masuoka et la teach starting with a porous membrane having pore diameters in the range from 0.05 micrometers to 1 micrometers and Lazear teaches an average pore size from about 200 to about 10000 Angstroms thus providing the desired pore size fro the process of Masuoka et al as well.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Taskier (3,853,601) discloses a hydrophilic microporous film provided by hot and/or cold stretching and useful as a battery separator.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Susan Berman whose telephone number is (703) 308-0040.

The fax number for this group is (703) 872-9310 or, for submissions after Final Rejection, (703) 872-9311.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist at telephone number (703) 308-0661.

Susan Berman

Susan Berman
Primary Examiner
Art Unit 1711

S B
1/25/02